Weeks 2-3: Stoichiometry

Chapter 3: Stoichiometry: Calculations With Chemical Formulas and Equations

Chapter 4: Aqueous Reactions and Solution Stoichiometry

This section presents the fundamental quantitative skills students will need for the rest of the course.

College Board Performance Objectives:

- Calculate the atomic weight (average atomic mass) of an element from the relative abundances and masses of its naturally occurring isotopes.
- Calculate the percentage composition of a compound from its formula.
- Calculate the molar mass of a substance from its chemical formula.
- Be able to interconvert between moles, mass, and number of particles of a substance.
- Calculate the empirical formula of a compound from either elemental percent composition or quantity of CO_2 and H_2O produced from its combustion.
- Calculate the molecular formula of a compound from the empirical formula and molecular weight.
- Find the mass of any substance in a chemical reaction from the mass of one substance.
- Determine the limiting reactant (limiting reagent) in a reaction and then calculate the amount of each product and the mass of the excess reactant left over.
- Calculate theoretical yield.
- Calculate moles of solute, volume of solution, or molarity of the solution from the other two.
- Recognize and solve dilution problems.
- Calculate the volume of a certain molarity solution required to react with another solution of known molarity.
- Calculate the mass of a substance that would be required to react with a given volume of a solution of known molarity.
- Calculate mass of solute or concentration of an unknown solution from titration data.

College Board Lab Objectives:
- To become familiar with chemical formulas (empirical and molecular) and how they are obtained experimentally.
- Learn some basic lab procedures, the chemistry of copper, and the concept of percent yield.

Troubleshooting Tips/Error Traps:
- Stress that the average mass of an atom is in amu and that the mass of a mole (Avogadro's number) of these atoms is the same number of grams.
- Electrons have negligible mass, therefore ions have essentially the same mass as their atoms.
- Reaction stoichiometry requires a correct, balanced chemical equation.